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Measuring the basic parameters of neutron stars using model atmospheres

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Abstract

© 2016, SIF, Springer-Verlag Berlin Heidelberg.Model spectra of neutron star atmospheres are nowadays widely used to fit the observed thermal X-ray spectra of neutron stars. This fitting is the key element in the method of the neutron star radius determination. Here, we present the basic assumptions used for the neutron star atmosphere modeling as well as the main qualitative features of the stellar atmospheres leading to the deviations of the emergent model spectrum from blackbody. We describe the properties of two of our model atmosphere grids: i) pure carbon atmospheres for relatively cool neutron stars (1-4MK) and ii) hot atmospheres with Compton scattering taken into account. The results obtained by applying these grids to model the X-ray spectra of the central compact object in supernova remnant HESS 1731-347, and two X-ray bursting neutron stars in low-mass X-ray binaries, 4U 1724-307 and 4U 1608-52, are presented. Possible systematic uncertainties associated with the obtained neutron star radii are discussed.

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